

Claims:

1. An apparatus for remotely monitoring and controlling a computing device, said apparatus comprising one or more stages adapted to:

- (a) receive one or more first signals from a controlled computing device coupled to said apparatus;
- (b) receive one or more second signals from a user over a network connection;
- (c) transmit at least one of said one or more first signals to said user over said network connection; and
- (d) transmit said one or more second signals to said controlled computing device;

wherein said apparatus is coupled to a relay, wherein said relay is coupled to both said controlled computing device and a power source for said controlled computing device, wherein said relay is moveable between a first position and a second position, wherein in said first position, said relay causes said power source to be coupled to said controlled computing device, wherein in said second position, said relay causes said power source to be decoupled from said controlled computing device, and wherein at least one of said one or more stages controls the movement of said relay between said first and second positions.

2. The apparatus of claim 1, wherein each of said first signals is selected from the set of: a video signal, and an output data signal.

3. The apparatus of claim 2, wherein each of said second signals is selected from the set of: a signal generated by a keyboard, a signal generated by a mouse, and a signal generated by an input device.

4. The apparatus of claim 3, wherein at least one of said one or more first signals transmitted to said user are transmitted to one of the

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devices selected from the set of: a video display device, a text display device, and an output peripheral device.

5. The apparatus of claim 1 further comprising a converter for converting at least one of said one or more first signals into digitized form for transmission over said network connection.

6. The apparatus of claim 5, wherein said converter is adapted to convert into digitized form at least one of said one or more first signals from each of a plurality of computing devices coupled to said apparatus.

7. The apparatus of claim 1, wherein said one or more stages are further adapted to receive signals from a plurality of users, and to transmit signals to a plurality of users.

8. The apparatus of claim 1, wherein said apparatus further comprises a multiplexer for coupling to a plurality of computing devices and for permitting said user to select a controlled computing device to be monitored from said plurality of computing devices.

9. The apparatus of claim 1, wherein said apparatus comprises a plurality of multiplexers, each of said plurality of multiplexers for coupling to a plurality of computing devices, wherein said plurality of multiplexers permits each of a plurality of users to select a controlled computing device to be monitored from said plurality of computing devices.

10. The apparatus of claim 1, wherein said one or more stages comprise a video input stage and a control stage, wherein said video input stage is implemented using a first device, and wherein said control stage is implemented using one or more second devices.

11. The apparatus of claim 1, wherein said control stage is implemented using a microprocessor and a gate array.

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12. The apparatus of claim 1, wherein said one or more stages are implemented using a single semiconductor device.
13. The apparatus of claim 12, wherein said single semiconductor device is a microprocessor.
14. An apparatus for monitoring a computing device, said apparatus comprising one or more stages adapted to:
 - (a) receive one or more signals from a controlled computing device;
 - (b) determining whether an error condition is present in said controlled computing device from said one or more signals; and
 - (c) generating an error indicator upon determining that an error condition is present in said controlled computing device.
15. The apparatus of claim 14, wherein each of said one or more signals is selected from the set of: a video signal from said controlled computing device, and an output data signal from said controlled computing device.
16. The apparatus of claim 14, wherein said one or more stages are further adapted to output said error indicator.
17. The apparatus of claim 14, wherein said one or more stages comprises a control stage, and wherein said control stage is implemented using a microprocessor and a gate array.
18. The apparatus of claim 14, wherein said one or more stages are implemented using a single semiconductor device.
19. The apparatus of claim 18, wherein said single semiconductor device is a microprocessor.

20. The apparatus as claimed in claim 14, wherein said apparatus comprises software that uses said error indicator to generate a message.

21. The apparatus as claimed in claim 20 further comprising a storage device, wherein said message comprises data for a log record for storing in said storage device.

22. The apparatus as claimed in claim 21, wherein said data comprises a date and a time that indicates when said error condition was determined.

23. The apparatus as claimed in claim 20, wherein said apparatus is coupled to a network, and wherein said message is sent to a user through said network.

24. The apparatus as claimed in claim 23, wherein said message is an electronic mail message comprising details of said error condition.

25. The apparatus as claimed in claim 14, wherein said apparatus coupled to a relay through a relay connection, wherein said relay is coupled to both said controlled computing device and a power source for said controlled computing device, wherein said relay is moveable between a first position and a second position, wherein in said first position, said relay causes said power source to be coupled to said controlled computing device, wherein in said second position, said relay causes said power source to be decoupled from said controlled computing device, wherein said one or more stages are adapted to control the movement of said relay between said first and second positions, and wherein upon determining that an error condition is present in said controlled computing device, the following steps are performed:

- (i) said relay is moved to said second position if said relay is in said first position, such that said controlled computing device is powered off; and

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33. The apparatus as claimed in claim 27, wherein said apparatus coupled to a relay through a relay connection, wherein said relay is coupled to

- (i) said relay is moved to said second position if said relay is in said first position, such that said controlled computing device is powered off; and
- (ii) said relay is moved from said second position to said first position after (i) is performed, such that said controlled computing device is powered on.

35. The apparatus as claimed in claim 34, wherein said output data signal is received by said one or more stages from a serial port on said controlled computing device.

(i) a first string detection method, wherein said one or more stages are adapted to determine whether said output data signal comprises a prespecified string of characters, and wherein said one or more stages are further adapted to generate said error

indicator if said output data signal comprises said prespecified string of characters; and

- (ii) a second string detection method, wherein said one or more stages are adapted to determine whether said output data signal has not comprised a prespecified string of characters within a prespecified interval, and wherein said one or more stages are further adapted to generate said error indicator if said output data signal has not comprised said prespecified string of characters within said prespecified interval.

37. The apparatus as claimed in claim 36, wherein said apparatus comprises software that uses said error indicator to generate a message.

38. The apparatus as claimed in claim 37 further comprising a storage device, wherein said message comprises data for a log record for storing in said storage device.

39. The apparatus as claimed in claim 38, wherein said data comprises a date and a time that indicates when said error condition was determined.

40. The apparatus as claimed in claim 37, wherein said apparatus is coupled to a network, and wherein said message is sent to a user through said network.

41. The apparatus as claimed in claim 40, wherein said message is an electronic mail message comprising details of said error condition.

42. The apparatus as claimed in claim 36, wherein said apparatus coupled to a relay through a relay connection, wherein said relay is coupled to both said controlled computing device and a power source for said controlled computing device, wherein said relay is moveable between a first position and a second position, wherein in said first position, said relay causes said power

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source to be coupled to said controlled computing device, wherein in said second position, said relay causes said power source to be decoupled from said controlled computing device, wherein said one or more stages are adapted to control the movement of said relay between said first and second positions, and wherein upon determining that an error condition is present in said controlled computing device, the following steps are performed:

- (i) said relay is moved to said second position if said relay is in said first position, such that said controlled computing device is powered off; and
- (ii) said relay is moved from said second position to said first position after (i) is performed, such that said controlled computing device is powered on.

43. The apparatus as claimed in claim 14, wherein said one or more stages are adapted to generate one or more test signals, wherein said one or more test signals are transmitted to said controlled computing device and are used to determine if an error condition is present in said controlled computing device, and wherein said one or more first signals comprise signals that are generated by said controlled computing device in response to said one or more test signals.

44. The apparatus as claimed in claim 43, wherein said one or more test signals simulate a press of a prespecified key on a keyboard, wherein said one or more stages are further adapted to: determine whether a signal was not transmitted by said controlled computing device to illuminate a prespecified light on said keyboard in response to said one or more test signals, and generate said error indicator if said signal was not transmitted by said controlled computing device to illuminate said prespecified light on said keyboard in response to said one or more test signals

45. The apparatus as claimed in claim 43, wherein said prespecified key is selected from the set of:

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- (i) a num lock key;
- (ii) a caps lock key;
- (iii) a scroll lock key;

and wherein said prespecified light is respectively selected from the set of:

- (i) a num lock light;
- (ii) a caps lock light;
- (iii) a scroll lock light.

46. The apparatus as claimed in claim 44, wherein said apparatus comprises software that uses said error indicator to generate a message.

47. The apparatus as claimed in claim 46 further comprising a storage device, wherein said message comprises data for a log record for storing in said storage device.

48. The apparatus as claimed in claim 47, wherein said data comprises a date and a time that indicates when said error condition was determined.

49. The apparatus as claimed in claim 46, wherein said apparatus is coupled to a network, and wherein said message is sent to a user through said network.

50. The apparatus as claimed in claim 49, wherein said message is an electronic mail message comprising details of said error condition.

51. The apparatus as claimed in claim 44, wherein said apparatus coupled to a relay through a relay connection, wherein said relay is coupled to both said controlled computing device and a power source for said controlled computing device, wherein said relay is moveable between a first position and a second position, wherein in said first position, said relay causes said power source to be coupled to said controlled computing device, wherein in said second position, said relay causes said power source to be decoupled from said controlled computing device, wherein said one or more stages are

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- (i) said relay is moved to said second position if said relay is in said first position, such that said controlled computing device is powered off; and
- (ii) said relay is moved from said second position to said first position after (i) is performed, such that said controlled computing device is powered on.

53. The apparatus as claimed in claim 43, wherein said one or more test signals comprise one or more ping requests, wherein said one or more stages are adapted to determine whether an echo response has not been received from said controlled computing device in response to a prespecified percentage of said one or more ping requests within a prespecified period of time, and wherein said one or more stages are further adapted to generate said error indicator if an echo response has not been received from said controlled computing device in response to a prespecified percentage of said one or more ping requests within said prespecified period of time.

55. The apparatus as claimed in claim 54 further comprising a storage device, wherein said message comprises data for a log record for storing in said storage device.

56. The apparatus as claimed in claim 55, wherein said data comprises a date and a time that indicates when said error condition was determined.

57. The apparatus as claimed in claim 54, wherein said apparatus is coupled to a network, and wherein said message is sent to a user through said network.

58. The apparatus as claimed in claim 57, wherein said message is an electronic mail message comprising details of said error condition.

59. The apparatus as claimed in claim 53, wherein said apparatus coupled to a relay through a relay connection, wherein said relay is coupled to both said controlled computing device and a power source for said controlled computing device, wherein said relay is moveable between a first position and a second position, wherein in said first position, said relay causes said power source to be coupled to said controlled computing device, wherein in said second position, said relay causes said power source to be decoupled from said controlled computing device, wherein said one or more stages are adapted to control the movement of said relay between said first and second positions, and wherein upon determining that an error condition is present in said controlled computing device, the following steps are performed:

- (i) said relay is moved to said second position if said relay is in said first position, such that said controlled computing device is powered off; and
- (ii) said relay is moved from said second position to said first position after (i) is performed, such that said controlled computing device is powered on.

60. The apparatus as claimed in claim 43, wherein said controlled computing device is a web server, wherein said one or more test signals comprise a request to retrieve a web page, wherein said one or more stages are adapted to determine whether a web page was not successfully retrieved

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from said controlled computing device in response to said request to retrieve said web page, and wherein said one or more stages are further adapted to generate said error indicator if said web page was not successfully retrieved from said controlled computing device in response to said request to retrieve said web page.

61. The apparatus as claimed in claim 60, wherein said apparatus comprises software that uses said error indicator to generate a message.

62. The apparatus as claimed in claim 61 further comprising a storage device, wherein said message comprises data for a log record for storing in said storage device.

63. The apparatus as claimed in claim 62, wherein said data comprises a date and a time that indicates when said error condition was determined.

64. The apparatus as claimed in claim 61, wherein said apparatus is coupled to a network, and wherein said message is sent to a user through said network.

65. The apparatus as claimed in claim 64, wherein said message is an electronic mail message comprising details of said error condition.

66. The apparatus as claimed in claim 60, wherein said apparatus coupled to a relay through a relay connection, wherein said relay is coupled to both said controlled computing device and a power source for said controlled computing device, wherein said relay is moveable between a first position and a second position, wherein in said first position, said relay causes said power source to be coupled to said controlled computing device, wherein in said second position, said relay causes said power source to be decoupled from said controlled computing device, wherein said one or more stages are adapted to control the movement of said relay between said first and second

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positions, and wherein upon determining that an error condition is present in said controlled computing device, the following steps are performed:

- (i) said relay is moved to said second position if said relay is in said first position, such that said controlled computing device is powered off; and
- (ii) said relay is moved from said second position to said first position after (i) is performed, such that said controlled computing device is powered on.

67. The apparatus as claimed in claim 14, wherein said one or more stages are further adapted to determine whether one or more selected error conditions of a plurality of error conditions are present in said controlled computing device from said one or more second signals, and to generate one or more error indicators to indicate which error conditions of said plurality of error conditions are present in said controlled computing device.

68. The apparatus as claimed in claim 67, wherein said apparatus further comprises software that allows a user to define said plurality of error conditions.

69. A method of monitoring a computing device, the method comprising the steps of:

- (a) receiving a plurality of signals generated by a controlled computing device;
- (b) determining from said plurality of signals whether an error condition is present in said controlled computing device; and
- (c) generating an error indicator upon determining that an error condition is present in said controlled computing device.

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70. The method of claim 69, wherein each of said plurality of signals comprises one of the following: a video signal from said controlled computing device, and an output data signal from said controlled computing device.

71. The method as claimed in claim 69, wherein said error indicator is used to generate a message.

72. The method as claimed in claim 71, wherein said message comprises data for a log record for storing in a storage device.

73. The method as claimed in claim 72, wherein said data comprises a date and a time, wherein said date and time indicates when said error condition was determined at step (b).

74. The method as claimed in claim 71, wherein said message is sent to a user through a network.

75. The method as claimed in claim 74, wherein said message is an electronic mail message.

76. The method as claimed in claim 69, wherein a relay is coupled to both said controlled computing device and a power source for said controlled computing device, and wherein upon determining that an error condition is present in said controlled computing device, the following steps are performed:

- (i) said relay is moved to a second position if said relay is in said first position, such that said controlled computing device is powered off; and
- (ii) after step (i) is performed, said relay is moved from said second position to said first position, such that said controlled computing device is powered on.

77. The method as claimed in claim 69, wherein said plurality of signals comprise signals associated with a video mode in which said controlled computing device is operating, wherein said signals associated with

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said video mode are used in determining whether an error condition is present in said controlled computing device.

78. The method as claimed in claim 77, wherein step (b) comprises determining whether said controlled computing device is operating in a text mode, and wherein step (c) comprises generating said error indicator if said controlled computing device is operating in a text mode as determined at step (b).

79. The method as claimed in claim 78, wherein said error indicator is used to generate a message.

80. The method as claimed in claim 79, wherein said message comprises data for a log record for storing in a storage device.

81. The method as claimed in claim 80, wherein said data comprises a date and a time, wherein said date and time indicates when said error condition was determined at step (b).

82. The method as claimed in claim 79, wherein said message is sent to a user through a network.

83. The method as claimed in claim 72, wherein said message is an electronic mail message.

84. The method as claimed in claim 78, wherein a relay is coupled to both said controlled computing device and a power source for said controlled computing device, and wherein upon determining that an error condition is present in said controlled computing device, the following steps are performed:

- (i) said relay is moved to a second position if said relay is in said first position, such that said controlled computing device is powered off; and

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- (iii) after step (i) is performed, said relay is moved from said second position to said first position, such that said controlled computing device is powered on.

85. The method as claimed in claim 69, wherein said plurality of signals comprise an output data signal from said controlled computing device.

86. The method as claimed in claim 85, wherein said output data signal is provided by a serial port on said controlled computing device.

87. The method as claimed in claim 86, wherein one of the following is performed to determine if an error condition is present in said controlled computing device:

- (i) a first string detection method, wherein step (b) comprises determining whether said output data signal comprises a prespecified string of characters, and wherein step (c) comprises generating said error indicator if said output data signal comprises said prespecified string of characters as determined at step (b); and
- (ii) a second string detection method wherein step (b) comprises determining whether said output data signal has not comprised a prespecified string of characters within a prespecified interval, and wherein step (c) comprises generating said error indicator if said output data signal has not comprised said prespecified string of characters within said prespecified interval as determined at step (b).

88. The method as claimed in claim 87, wherein said error indicator is used to generate a message.

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89. The method as claimed in claim 88, wherein said message comprises data for a log record for storing in a storage device.

90. The method as claimed in claim 89, wherein said data comprises a date and a time, wherein said date and time indicates when said error condition was determined at step (b).

91. The method as claimed in claim 88, wherein said message is sent to a user through a network.

92. The method as claimed in claim 91, wherein said message is an electronic mail message.

93. The method as claimed in claim 87, wherein a relay is coupled to both said controlled computing device and a power source for said controlled computing device, and wherein upon determining that an error condition is present in said controlled computing device, the following steps are performed:

- (i) said relay is moved to a second position if said relay is in said first position, such that said controlled computing device is powered off; and
- (ii) after step (i) is performed, said relay is moved from said second position to said first position, such that said controlled computing device is powered on.

94. The method as claimed in claim 69, wherein said method also comprises the steps of generating one or more test signals, and transmitting said one or more test signals to said controlled computing device to determine if an error condition is present in said controlled computing device, wherein said plurality of signals received at step (a) comprise signals that are generated by said controlled computing device in response to said one or more test signals.

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96. The method as claimed in claim 95, wherein said prespecified key is selected from the set of:

- and wherein said prespecified light is respectively one of the following:

97. The method as claimed in claim 95, wherein said error indicator is used to generate a message.

99. The method as claimed in claim 98, wherein said data comprises a date and a time, wherein said date and time indicates when said error condition was determined at step (b).

100. The method as claimed in claim 97, wherein said message is sent to a user through a network.

101. The method as claimed in claim 100, wherein said message is an electronic mail message.

102. The method as claimed in claim 95, wherein a relay is coupled to both said controlled computing device and a power source for said controlled computing device, and wherein upon determining that an error condition is present in said controlled computing device, the following steps are performed:

- (i) said relay is moved to a second position if said relay is in said first position, such that said controlled computing device is powered off; and
- (ii) after step (i) is performed, said relay is moved from said second position to said first position, such that said controlled computing device is powered on.

103. The method as claimed in claim 94, wherein said one or more test signals comprise one or more ping requests, wherein step (b) comprises determining whether an echo response has not been received from said controlled computing device in response to a prespecified percentage of said one or more ping requests within a prespecified period of time, and wherein step (c) comprises generating said error indicator if said echo response has not been received from said controlled computing device in response to said prespecified percentage of said one or more ping requests within a prespecified period of time as determined at step (b).

104. The method as claimed in claim 103, wherein said error indicator is used to generate a message.

105. The method as claimed in claim 104, wherein said message comprises data for a log record for storing in a storage device.

106. The method as claimed in claim 105, wherein said data comprises a date and a time, wherein said date and time indicates when said error condition was determined at step (b).

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107. The method as claimed in claim 104, wherein said message is sent to a user through a network.

108. The method as claimed in claim 107, wherein said message is an electronic mail message.

109. The method as claimed in claim 103, wherein a relay is coupled to both said controlled computing device and a power source for said controlled computing device, and wherein upon determining that an error condition is present in said controlled computing device, the following steps are performed:

- (i) said relay is moved to a second position if said relay is in said first position, such that said controlled computing device is powered off; and
- (ii) after step (i) is performed, said relay is moved from said second position to said first position, such that said controlled computing device is powered on.

110. The method as claimed in claim 94, wherein said controlled computing device is a web server, wherein said one or more test signals comprise a request to retrieve a web page, wherein step (b) comprises determining whether a web page was not successfully retrieved from said controlled computing device in response to said request to retrieve said web page, and wherein step (c) comprises generating said error indicator if said web page was not successfully retrieved from said controlled computing device in response to said request to retrieve said web page as determined at step (b).

111. The method as claimed in claim 110, wherein said error indicator is used to generate a message.

112. The method as claimed in claim 111, wherein said message comprises data for a log record for storing in a storage device.

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113. The method as claimed in claim 112, wherein said data comprises a date and a time, wherein said date and time indicates when said error condition was determined at step (b).

114. The method as claimed in claim 111, wherein said message is sent to a user through a network.

115. The method as claimed in claim 115, wherein said message is an electronic mail message.

116. The method as claimed in claim 110, wherein a relay is coupled to both said controlled computing device and a power source for said controlled computing device, and wherein upon determining that an error condition is present in said controlled computing device, the following steps are performed:

- (i) said relay is moved to a second position if said relay is in said first position, such that said controlled computing device is powered off; and
- (ii) after step (i) is performed, said relay is moved from said second position to said first position, such that said controlled computing device is powered on.

117. The method as claimed in claim 69, wherein the steps of said method are repeated for one or more selected error conditions of a plurality of error conditions.

118. The method as claimed in claim 117, wherein said method further comprises the step of receiving input from a user, wherein said input is used to define said plurality of error conditions.

119. The method as claimed in claim 69 further comprising the step of outputting said error indicator.

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